

REMARKS

Claims 21-24 and 27 are in the case and Claims 21-24 and 27 are rejected under 35 USC § 112 and 103. Claim 21 is objected to.

Claims 21-24A ND 27 have been amended to more clearly define applicants invention.

No new matter has been added.

Withdrawal of Rejections

Applicants thank the examiner for the withdrawal of the previous rejections under 35 USC § 112.

Objections to the claims

Claim 21 is objected to for the inclusion of 2 periods at the end of the sentence. Claim 21 has been amended to overcome this objection. Accordingly, Applicants respectfully request withdrawal of the objection directed to claim 21.

Rejections Under 35 U.S.C. §112, Second Paragraph

Claims 21-24 and 27 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. The examiner finds the use of the phrase “consisting essentially of” indefinite and has chosen to construe the phrase as equivalent to “comprising”. Applicants traverse.

Claim 21 has been amended to recite that the composition is “consisting of “ the specified elements of the composition. The term “consisting of” is clearly recognized as excluding any element, step, or ingredient not specified in the claim. *In re Gray*, 53 F.2d 520, 11 USPQ 255 (CCPA 1931); *Ex parte Davis*, 80 USPQ 448, 450 (Bd. App. 1948) [MPEP 2111.03]. In view of this amendment applicants submit the claim is not indefinite.

Claim Rejections – 35 USC § 103

Claims 21-24 and 27 remain rejected under 35 U.S.C. § 103(a) as being unpatentable over Guo et al. (Adv. Mater., 1998, 10(9): 701-703) in view of O’Connell et al. (Chemical Physics Letters, 342 (2001), 265-271).

Guo et al teach the use of carbon nanotubes as surfaces for the visualization of biomolecules including DNA. Guo et al does not teach a singly dispersed carbon-nanotubes associated with DNA.

O’Connell et al. teaches the dispersion of carbon nanotubes with water soluble polymers. O’Connell et al. does not suggest DNA or any other nucleic acid as a dispersant.

The examiner suggests that the skilled person would find it obvious to apply the teachings of O'Connell et al. relating to the use of water soluble polymers to the observation by Guo that DNA adsorbs onto carbon nanotubes to derive the present invention. Applicants traverse.

Claim 21 is drawn to a composition having the following elements:

- a) A singly dispersed, unfunctionalized, single walled carbon nanotube; and
- b) A single stranded nucleic acid molecule associated with the carbon nanotube by non-covalent means.

Guo et al teach double stranded DNA (see last paragraph of 701, line 7 "self complementary") adsorbed onto a carbon nanotube. Guo does not teach single stranded nucleic acids. O'Connell et al do not teach any type of nucleic acid. Therefore the combined references do not teach all the elements of the claimed invention. [MPEP 2143].

The examiner suggests that the skilled person would find it obvious to apply the dispersion of SWNT of O'Connell et al to the nanotube complex of Guo et al. (page 4 of the present action). For this to be so there must be some teaching of predictability that the water soluble polymers taught by O'Connell et al would behave in a manner similar to single stranded nucleic acids. Applicants submit this teaching of predictability is lacking in O'Connell et al.

O'Connell et al specifically states that not all water-soluble polymers are effective as dispersants (see page 269, paragraph 3.4, line 9). O'Connell et al suggests an algorithm for predicting the structure of a suitable polymer (end of first column, page 269) however there is no teaching or suggestion of how to apply that algorithm to a single stranded nucleic acid molecule. Consequently the skilled person would have no basis in O'Connell et al to choose a single stranded nucleic acid molecule as a dispersant and thus the combination of Guo et al and O'Connell et al would not give the skilled person any reasonable expectation of success and do not render the present claims obvious.

Applicants take note of the examiner's comments with respect to dependant claims 22, 23, 24 and 27 however submit that the disclosures of the cited art with respect to these claims is moot in view of the above arguments.

Claims 21-24 and 27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsang et al. (Angew, Chem. Int., 1997, 36(20): 2198-2200) in view of O'Connell et al. (Chemical Physics Letters, 342 (2001), 265-271).

The teachings of O'Connell et al. have been given above.

Tsang teach the absorption of platinated double stranded DNA on the surface of closed and open carbon nanotubes.

The examiner suggests that the skilled person would find it obvious to apply the teachings of O'Connell et al. relating to the use of water soluble polymers to the observation

by Tsang et al. that DNA adsorbs onto carbon nanotubes to derive the present invention. Applicants traverse.

In the context of the present rejection the teaching of Tsang et al. does not expand on the teaching of Guo above. Tsang et al teach double stranded DNA (see last paragraph of 2198, "DNA duplex" and see top of second column of 2198, "self complementary") adsorbed onto a carbon nanotube. Tsang does not teach single stranded nucleic acids. O'Connell et al do not teach any type of nucleic acid. Therefore, the combined references do not teach all the elements of the claimed invention. [MPEP 2143].

Applicants reiterate the argument made above with respect to Guo in view of O'Connell et al that the element of predictability relating a water-soluble polymer to a single stranded DNA molecule is lacking in O'Connell et al and therefore the skilled person would have no reasonable expectation of success in applying the teachings of O'Connell et al to the observations of Tsang.

Applicants take note of the examiner's comments with respect to dependant claims 22, 23, 24 and 27 however submit that the disclosures of the cited art with respect to these claims is moot in view of the above arguments.

Claims 21-24 and 27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Massey et al. (U.S. Patent No. 5,866,434) in view of the O'Connell et al.

The teachings of O'Connell et al. have been given above.

Massey et al. teach the linking of DNA through a biotin – avidin association to a functionalized carbon nanotube. Massey et al. do not teach the association of a single stranded nucleic acid molecule with an unfunctionalized carbon nanotube.

The examiner suggests that the skilled person would find it obvious to apply the teachings of O'Connell et al. relating to the use of water soluble polymers to the observation by Massey et al. that DNA maybe linked to carbon nanotubes to derive the present invention. Applicants traverse.

The examiner notes (page 6 of the present action) that Massey et al. discloses a "dispersed" complex comprising a carbon nanotube bound to a nucleic acid. The examiner points to example 6 as support for this statement. Applicants can find no statement in example 6 or in any other part of the disclosure that suggests that the carbon nanotubes (referred to by Massey et al. as "fibrils") are dispersed. Clarification is respectfully requested.

The elements of the present claims are recited above. Massey et al. specifically teach functionalized carbon nanotubes (see the abstract and examples 5 and 6 where the carbon nanotubes are functionalized with avidin). The present claims specifically recite that the carbon nanotubes are unfunctionalized. Massey et al. make no mention of the use of single stranded DNA. The present claims recite the limitation that the nucleic acid molecule is single stranded. Applicants submit that the fibrils of Massey et al. are not dispersed as,

absent specific teaching of dispersionm carbon nanotubes will associate into ropes. The present claim recites the limitation that the carbon nanotubes are dispersed. The teachings of O'Connell et al. do not teach the use of any nucleic acid. Thus the combination of these references do not teach all the elements of the claimed invention.

As noted above whether the combination of these references renders the present invention obvious depends on whether the skilled person would view the water soluble polymers of O'Connell et al. as equivalents to single stranded nucleic acids. For reasons cited above applicants submit that they would not and that the skilled person would have no reasonable expectation of success in applying the teachings of O'Connell et al. and Massey et al to derive the present invention.

Applicants take note of the examiner's comments with respect to dependant claims 22, 23, 24 and 27 however submit that the disclosures of the cited art with respect to these claims is moot in view of the above arguments.

Response to Applicants Arguments

The examiner restates her position that the open ended phrase "consisting essentially of" must be interpreted as "comprising" and as such includes double stranded DNA. Applicants submit that the amendment of claim 21 to the closed "consisting of" limits the claim to single stranded nucleic acids.

Double Patenting Rejections

Claims 21-23 and 27 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 14 and 19 of co-pending Application No. 10/716,347. The examiner maintains the view that although the claims are not identical they are not patentable distinct.

A timely filed terminal disclaimer may be used to overcome this rejection. Without intending to agree with the examiner's rationale under this rejection applicants file herewith a terminal disclaimer disclaiming the terminal portion of any patent that grants on the present application that extends beyond the term of co-pending Application No. 10/716,347.

Should the Examiner wish to discuss any issues involved in this application, the Examiner is respectfully invited to contact the undersigned at the telephone exchange set forth below. Should there be any fee due in connection with the filing of this Amendment, please charge such fee to Deposit Account No. 04-1928 (E. I. du Pont de Nemours and Company).

Respectfully submitted,

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